FRD Activities Report
May 2000

Research Programs

Long Range Overwater Diffusion Experiment (LROD)

We received a request from the Navy for data from the Long Range Overwater Diffusion experiment (LROD) that was conducted in 1993. Apparently, their main interest was instantaneous peak to average concentration ratios. A complete set of tracer data was delivered to them, including both continuous analyzer and bag sampler data. A copy of the project's final report was also included. (Roger.Carter@noaa.gov)

Central California Ozone Study (CCOS)

After much planning and preparation, Jerry Crescenti, Shane Beard, and Tom Strong departed Idaho Falls on May 15 for California to deploy nine meteorological towers and an array of ground-based remote sensors consisting of a 915-MHz radar wind profiler, a Doppler sodar and a radio acoustic sounding system (RASS). This four-month field study begins on June 1, 2000 and ends on September 30, 2000. The final locations of the nine meteorological towers are:

Station	ID	Lat (N)	Lon (W)	Elev (m)
Carrizo Plain	CAR	35° 23.76'	120° 05.11'	624
Piedras Blancas	PBL	35° 39.89'	121° 17.08'	5
McKittrick	MKT	35° 18.20'	119° 37.36'	323
Kettleman City	KET	36° 05.71'	119° 57.02'	54
Granite Bay	GRN	38° 44.30'	121° 11.95'	102
Suisun City	SUI	38° 13.19'	121° 50.84'	29
Point Reyes	REY	38° 05.73'	122° 56.89'	30
Shasta Lake	SHA	40° 41.35'	122° 24.14'	258
Bella Vista	BEL	40° 37.13'	122° 17.86'	186

Measurements from these towers include wind speed and wind direction, air temperature, and relative humidity. These data are recorded as 5-min averages and are now being transmitted to FRD several times per day via phone lines for quality control (QC) screening and distribution to

CCOS principle investigators. The 915-MHz radar wind profiler, radio acoustic sounding system (RASS), and Radian 600PA phased-array Doppler sodar was deployed on the Carizzo Plain (the middle of nowhere). Wind profiles acquired by the radar and sodar are being acquired as one-hour averages while temperature profiles obtained from the RASS are reported once per hour as 5-min averages. These data are also be transmitted to FRD for QC screening and availability to the CCOS community. (Jerry.Crescenti@noaa.gov, Randy Johnson, Shane Beard, and Tom Strong)

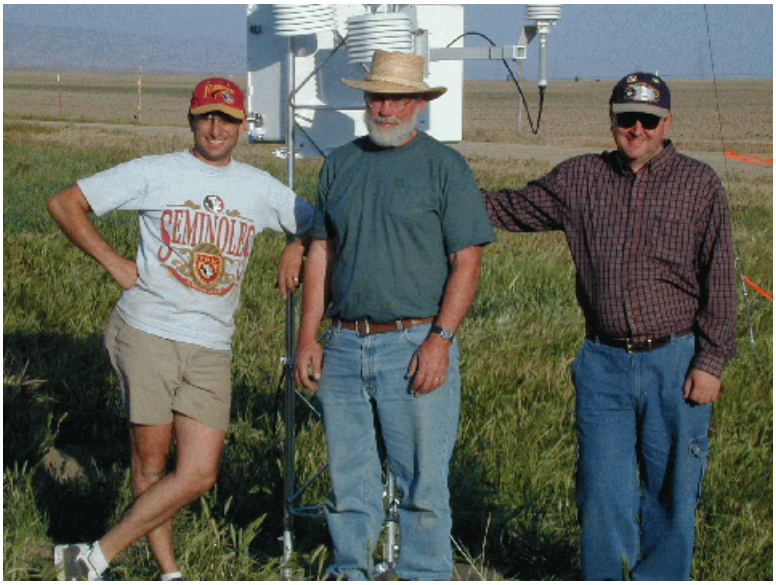

Figure 1. From left to right: Jerry Crescenti, Tom Strong, and Shane Beard in front of a 10-m meteorological tower in Carrizo Plain.

Vertical Transport and Mixing Experiment-Chemical and Biological Non-proliferation Program 2000 (VTMX-CBNP 2000)

Preparation for the extensive VTMX-CBNP 2000 experiment is well underway. The current participation level calls for the involvement of nearly all FRD personnel. Project schedules with appropriate milestones have been established to ensure that preparations will be completed on time and within budget. (Kirk.Clawson@noaa.gov and staff)

Work has begun on bringing the real-time SF_6 analyzers out of cold standby mode for use this fall. In addition, work has begun to simplify the installation of the analyzers by making them lighter and more portable. This will eliminate the need to use a 3/4 ton van to transport each sampler and will permit a much wider assortment of deployment vehicles such as 4-wheelers or compact automobiles. The system will also be much safer to use through the elimination of the large hydrogen tanks required by the previous design. (Roger.Carter@noaa.gov, James Angell, Kirk Clawson)

Forty of the FRD SF_6 programmable samplers will be modified to accommodate capillary absorption tube samplers (CATS) to sample perflourocarbon tracers (PFTs) that will be used during VTMX. In conjunction with the preparation for this modification, the FRD office, laboratory, and warehouse were sampled for PFT contamination. It was discovered that the contamination level in some cases is 10,000 times background. We believe that we have discovered the sources of the contamination and are working to eliminate them. (Kirk.Clawson@noaa.gov, Randy Johnson)

Extreme Turbulence (ET) Probe

This month, the proposal "Development and Deployment of an Extreme Turbulence (ET) Probe for Hurricane and High Wind Research" received NOAA co-funding under the U. S. Weather Research Program (USWRRP). Under this project, we propose to develop and deploy an innovative Extreme Turbulence (ET) probe for acquiring surface-based turbulent heat and momentum flux in hurricane-force wind and rain conditions.

Development of the ET Probe proposal required research into how we could fabrication the probe housing and how it should be ported for optimum performance. As illustrated, tooling was developed to manufacture the probe shells from fiber-composites. We encountered no problems pulling the first 40-cm half-sphere from the mold. The advantage of fiberglass-epoxy composite construction is that the shells will be simple to produce, highly resilient, corrosion-free, versatile, and lightweight.

Figure 2. Randy Johnson exhibits the newly formed ET probe hemisphere.

The main design constraint is that a sufficient number of pressure ports must lie within about 60 degrees of the flow stagnation point to allow the computation of both the stagnation point's location and the dynamic pressure. There is, of course, also a desire to minimize costs by keeping the number of pressure sensors to a minimum. The chosen design calls for rings of pressure ports at three "latitudes" on the ET sphere. Within each ring, the ports would be spaced at 36 degree "longitude" intervals. (Tim.Crawford@noaa.gov, Jerry Crescenti, Randy Johnson, and Ron Dobosy)

Cooperative Research with INEEL

Sagebrush Steppe Ecosystem Year-round Flux Site

Work continues on the flux site established to continuously measure year-round fluxes of carbon dioxide and water vapor on a sagebrush steppe ecosystem. The source of data spikes was discovered and programs were written to eliminate the errors. Next month a visit is planned from a botanist from Idaho State University who has been studying the productivity of the ecosystem. These data will be correlated with the fluxes obtained from the FRD eddy correlation system and the USDA Bowen Ratio system. (Kirk.Clawson@noaa.gov)

INEEL Mesoscale Modeling

Through much of May, semiautomated MM5 mesoscale forecasts of the INEEL region were run on the Compaq Alpha workstation at FRD. These were initialized from the 0600 UTC runs of the Eta model, available from the National Centers for Environmental Prediction (NCEP). It was noticed fairly quickly that the forecast afternoon winds near INEEL were frequently too light in

comparison to the observations from FRD's tower network. This appears to be caused by the ground being too wet in the model. The high soil moisture reduces both the development of orographic winds and the downward mixing of momentum from aloft. In the MM5 configuration currently being used, the soil moisture is initialized from the Eta model's output. The Eta volumetric soil moisture in Southeast Idaho was ranging from 0.20-0.35 m^3m^{-3} in the top 10 cm, which is close to field capacity for many soils. Additional simulations were performed using the RUC (Rapid Update Cycle) model for initialization rather than the Eta model. The soil moisture in Southeast Idaho from the RUC was only about half of that from the Eta. Additional investigation showed that the Eta soil moisture was systematically higher than the RUC soil moisture throughout much of North America. So far, no explanation has been found for the large soil moisture differences between the RUC and Eta models. (Richard.Eckman@noaa.gov)

Web Weather Camera

The DOE has given the green light to place our weather camera images of current INEEL weather on the web. A shareware package for automatically capturing images in real-time and placing them on the web server was investigated. The installation was simple and straight-forward. Soon you will be able to observe INEEL weather as it occurs from the comfort of your office chair. (Kirk.Clawson@noaa.gov)

Real-time Web Weather Display Facelift

The FRD real-time web weather display (http://www.noaa.inel.gov/windvector/) is receiving a facelift. Work is underway to display maximums and minimums of wind speed, wind gust, air temperature and barometric pressure and the time of occurrence. In addition, graphs of data will also be available. (Brad.Reese@noaa.gov, Bill Behymer, Kirk Clawson)

Other Activities

Poster Award

A poster presented at the Sixth International Conference on Remote Sensing for Marine and Coastal Environments in Charleston, South Carolina was given the "Best of Session" award. This poster was based on the paper entitled *Measurements Pertaining to Air-sea Interaction with a Small Instrumented Aircraft* that was written for this conference by Jeff French, Jerry Crescenti, Tim Crawford, Ed Dumas and Doug Vandemark. (Jerry.Crescenti@noaa.gov, Jeff French, Tim Crawford)

Proposals

In April, we submitted three pre-proposals and were Co-PI's on two additional proposals to the Office of Naval Research's (ONR) Coupled Boundary Layers/Air-Sea Transfer (CBLAST) research initiative. ONR requested full proposals on four of the five submissions. In response, the following proposals were prepared and submitted:

Determination of the Spatial Variation of the Atmosphere and Ocean Wave Fields in Extremely Light Wind Regimes (CBLAST/Light Wind Research)

Development and Deployment of an Extreme Turbulence (ET) Probe for Hurricane and High Wind Research (CBLAST/Hurricane Research)

Air-Sea Flux Estimation in High Wind Boundary Layers (CBLAST/High-wind Research)

P3-Based Investigations of Air-Sea Interactions under High Wind (CBLAST/Hurricane Research)

Proposals Reviewed

Tim Crawford reviewed a proposal intended for submission to NSF.

Papers

French, J. R., G. H. Crescenti, T. L. Crawford, E. J. Dumas, and D. Vandemark, 2000: Measurements pertaining to air-sea interaction with a small instrumented aircraft. Proc., *Sixth International Conference on Remote Sensing for Marine and Coastal Environments*, Charleston, SC, May 1-3, Veridian ERIM International, II-110-II-113.

Carter, R. G. and R. Ridenour: An Improved Short Term Transport and Dispersion Forecasting Method, submitted to *Radiation Protection Management.*

Vandemark, Douglas, Pierre Mourad, Tim Crawford, Chris Vogel, and Jielun Sun. Measured correlation between roll-vortex signatures and radar-inferred sea surface roughness. Revised manuscript submitted to *Journal of Geophysical Research.*

Travel

Jerry Crescenti and Jeff French attended the Sixth International Conference on Remote Sensing for Marine and Coastal Environments from May 1-3, 2000 in Charleston, South Carolina.

Jerry Crescenti traveled to California to deploy a radar profiler and Doppler sodar in Carrizo Plain from May 16-22, 2000.

Shane Beard and Tom Strong traveled to various locations in California to deploy nine meteorological towers and a radar wind profiler and Doppler sodar from May 15-26, 2000.

Tim Crawford met with Darryl Randerson, SORD Director, on May 23, 2000, in Las Vegas to discuss DOE programs and research activity.

Training

Tim Crawford attended the Pre-Retirement Planning course presented by the USDA Graduate

School in Las Vegas on May 24-26, 2000. The course covered retirement eligibility, annuity computation, survivor benefits, health and life insurance benefits, social security and medicare benefits, thrift savings plan options and income tax requirements.

Personnel

The application period for the physical scientist vacancy created by the retirement of Dianne Hoover ended on the 4th of May. A total of 27 applications were received, of which 14 were determined by MASC HRD to be qualified. A crediting plan was subsequently prepared and a panel of peers convened to rate the applications for the agency-based recruitment. The certifications have been received and interviews will be conducted in June. (Kirk.Clawson@noaa.gov and staff)